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OCEANUS

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EDITOR: JAN HAHN

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From bottom to Top

THE cover photo by [illegible] was made while lying flat on his back on the foredeck of the 'Atlantis'. Jib, staysail and mainsail are shown.

The imaginative photograph on this page was made by D. M. Owen from about two-thirds up the mainmast by taking a series of five photographs and overlapping the negatives. The 'Atlantis' was leaving Mobile, Alabama, hence the beautifully straight wake and calm water.

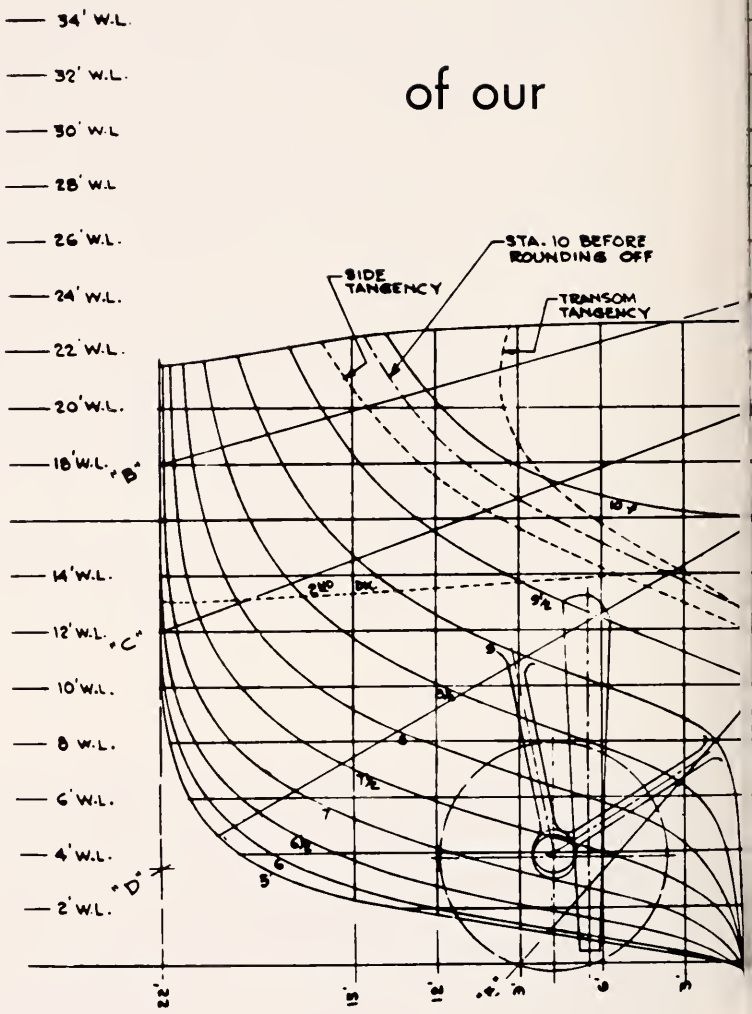
Editorial

VOL. VIII, No. 4, June 1962

HENRY STOMMEL once asked: "why do so many of our ideas . . . have such a peculiar dreamlike quality?" It seems strange that when oceanographers are able to dream so well they have so little imagination in naming their new ships. The British are building the Discovery IV, the Bureau of Commercial Fisheries is building the Albatross IV and now we are building the Atlantis II!

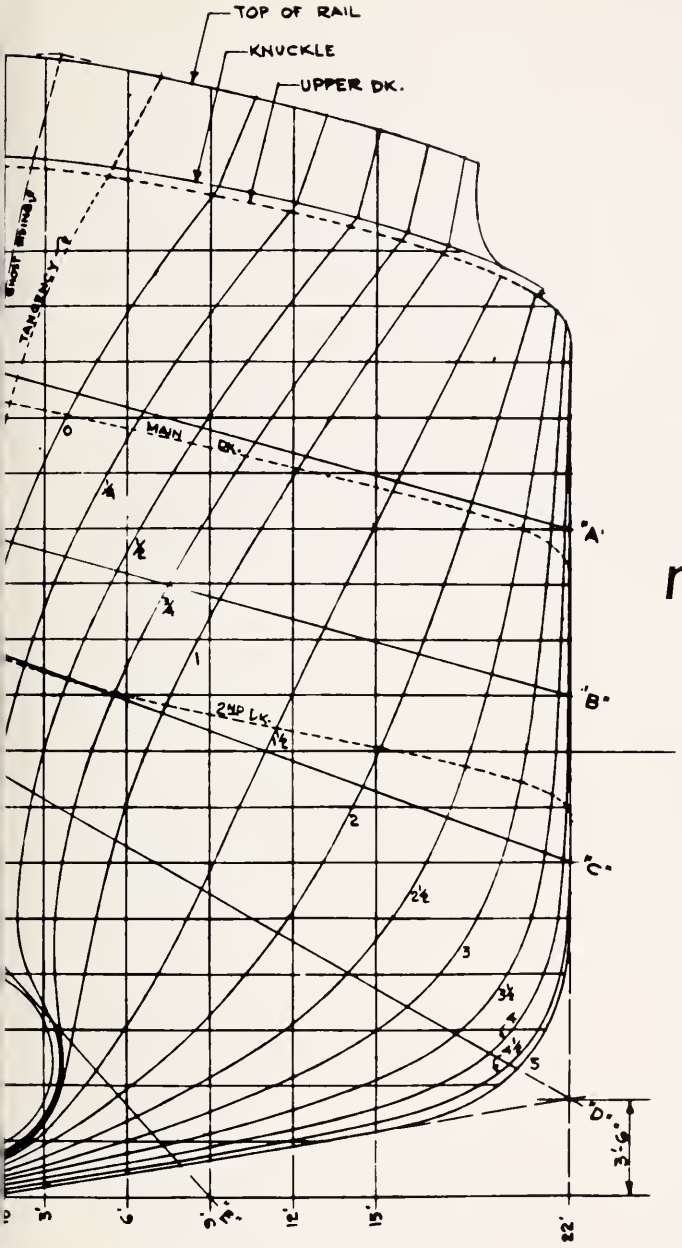
The editor feels with many others that a better name could be found, although he realizes the name is the result of a poll. There is a rather large pool of sentimentalists, including ourselves, who feel there is but one Atlantis. Apart from this emotional reasoning, the naming of a ship after a famous predecessor provides the new ship with an awe inspiring challenge to have to live up to. Moreover, there are two most practical aspects. Are the Atlantis stations going to be numbered on or are they going to be numbered AII-1111? As is obvious, in this example, this may lead to untold confusion and printing errors in the literature. Finally, both ships will be operating at the same time. "Where is the Atlantis?" "Which one?" This is confusing.

Design of our



BY JONATHAN LEIBY

The oceanographic research ship now under construction for the Institution will be the first major vessel designed and constructed for oceanographic service by a private laboratory in the United States since we built the 142 ft. ketch 'Atlantis' in 1931.



new Research Vessel

THE unprecedented expansion in scientific effort, in personnel, and in facilities which now faces oceanography presents problems directly affecting the construction of a new research vessel. Costly research ships are required and they must be designed to extract the maximum scientific return throughout the useful life of the vessel. In the present rapid expansion of oceanography the requirements of the scientists are changing, and there are often complete shifts in emphasis with the adoption of modern and advanced tools for research. These changing requirements demonstrate the need to allow for expected future changes by providing a vessel which will afford the greatest freedom in the use of new tools and techniques. Facilities and favorable

conditions for the development, testing, and operation of acoustical equipments must have high priority in any new ship construction. In addition the Institution, as a result of long experience in the successful operation of research vessels, has determined to build a ship to the highest requirements for safety, reliability, flexibility, quietness, low vibration, low maintenance cost, low operating cost, slow speed capability, and sea-keeping ability.

The ship, to be named 'Atlantis II', has been designed to do effective all weather oceanographic research from the fringe ice to the tropics and will be able to accommodate more than one scientific discipline on a given cruise.

Construction

The vessel will be of welded steel construction and have twin screws with twin rudders. She will carry advanced navigational and scientific equipment and will be fitted with modern, quiet, and versatile laboratories. Special features will include bow maneuvering by means of a transverse bow thruster with bridge control, an underwater observation chamber in the bow, a center well, an anti-rolling tank, articulated cranes to handle scientific and other equipment in a seaway, a stern ramp, and full control of propulsion and steering from five topside location including the bridge.

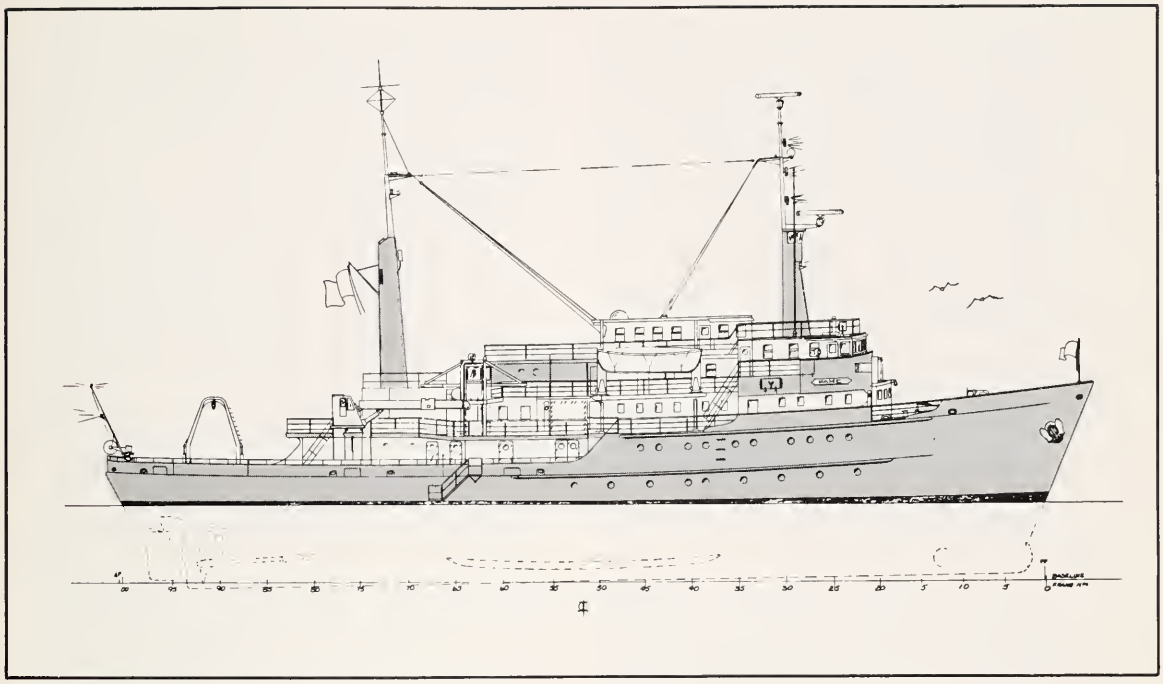
Scientific handling gear includes a steam powered deep sea winch, a thermistor winch, two hydrographic winches, two bathythermograph winches, a hydraulically actuated "A" frame, a centerwell hoist and an inter-laboratory hoist. Provision has been made for the installation of two portable laboratories, one on the main deck and one on the upper deck. The vessel will carry a rescue type lifeboat, five inflatable life-rafts and a utility boat. A magazine for stowage of explosives used in seismic studies is provided. The design contains special features for reducing noise and vibration to a minimum. In addition, all living quarters, public rooms, laboratories and other work spaces will be air conditioned.

The propelling machinery consisting of two three-cylinder Unaflow steam engines, will have its steam supplied from two oil burning water-tube steam generators and will develop a rated shaft horsepower of 1400. Speed and direction of the propellers will be completely controlled from either the bridge or four auxiliary bridge wing maneuvering stations by means of a single lever for each main engine. The boilers will be automatically controlled to meet the steam demand. The two auxiliary generators are rated at 300 kilowatts with 440 volt, 60 cycle, three phase alternating current. An emergency diesel generator of 60 kw will be fitted and will also supply "silent ship" power.

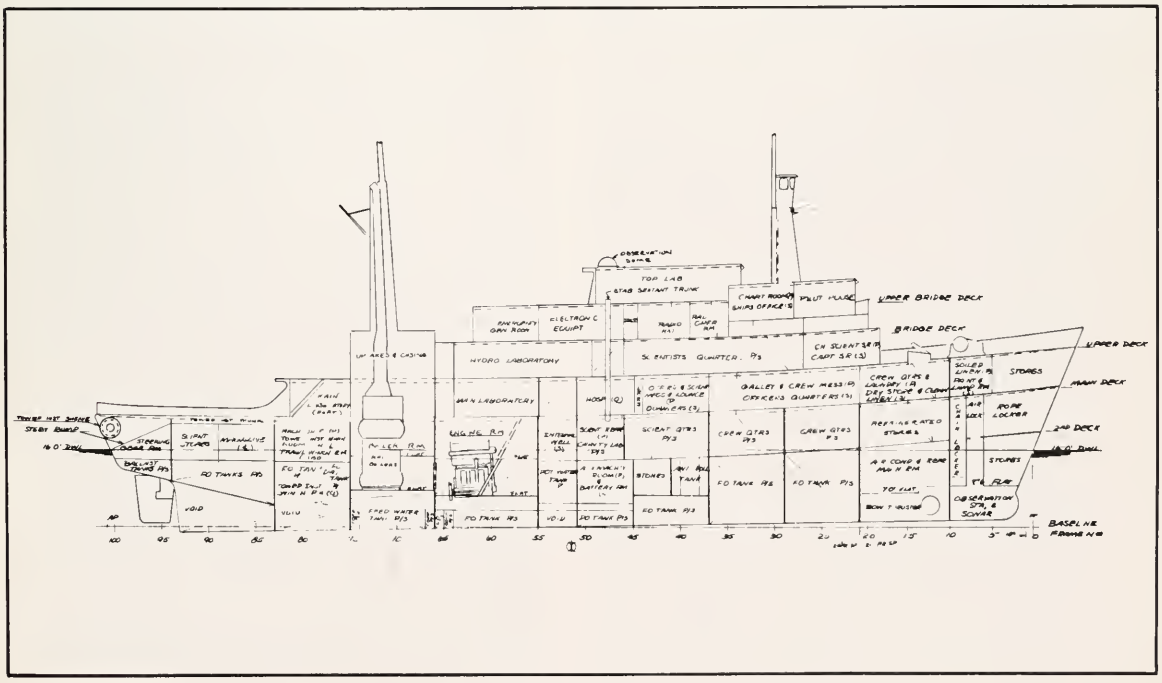
The vessel and equipment will be built under survey of the American Bureau of Shipping and will be inspected by the U.S. Coast Guard and by the U. S. Public Health Service.

History

The design of the vessel is the result of long experience in the operation of research vessels and of intensive study of the requirements and desirable features of such vessels at sea. Experience with specially designed and constructed ships at the Institution began with the building of the 'Atlantis' in 1931 coincident with the founding of the Institution. The long and successful career of the 'Atlantis' is to be a considerable degree attributable to the fact that she was designed for oceanographic research in view of the best experience and knowledge available at the time of construction. It is noteworthy that the 'Atlantis' remains today the only major research vessel under the U.S. flag which was especially designed and built for the task.



The outboard and inboard profiles of our new 195′ ship.



Later in 1959, with a preliminary design at hand, the Institution submitted a proposal to the National Science Foundation for funds for the design and construction of the vessel. The National Science Foundation is an agency of the U.S. federal government for initiating and supporting basic scientific research and programs. Upon receipt of the grant, the Central Technical Department of the Shipbuilding Division of the Bethlehem Steel Company was retained as a design agent for the Institution. The firm of M. Rosenblatt & Son was retained by CTD as an associate in the design while the acoustics group of the Electric Boat Company was employed as acoustical consultants.

In June 1961 bids were received for the construction of the vessel and a $3,876,312 contract for the construction was placed with the Maryland Shipbuilding & Drydock Company of Baltimore, Maryland.

Model Test Program

The preliminary design showed a ship 170 ft. long. Model tests were made of the research vessel 'Chain' and the preliminary design to evaluate comparative seagoing qualities. Each model was tested in irregular waves corresponding to a sea generated by a force 6 wind on the Beaufort scale. The models were tested in head seas, in a hove to condition, and in beam and quartering sea. Comparative bow and stern accelerations of the 170 ft. design ranged from 20% to 40% above those of the 'Chain' in head seas, but were about equal to those of 'Chain' in quartering seas. The increased accelerations in head seas appeared to be associated with the shorter length of the 170 ft. design. Lateral midship accelerations of the 170 footer were about 15% higher than those of the 213 ft. 'Chain'. Later, when it was found necessary to lengthen the design for other considerations, the results of the seakeeping tests assisted that decision.

MR. LEIBY joined our staff as naval architect in 1959, and is concerned with our fleet's problems and the design and building of our new ship.

Special Features

The bow observation chamber will be essentially a 7 ft. diameter cylinder with a hemispherical end superimposed on a normal bow. This space will accommodate two observers and have six ports to view ahead, down, and up to the water surface at the stem. The vessel also will be fitted with a passive anti-rolling tank system of 31 tons capacity (50% full) which is approximately 1.5% of displacement. The operating liquid generally will be fresh water. The passive anti-rolling tank is employed because it operates at all speeds in contrast to anti-rolling fins which depend upon forward motion of the ship. A gyro stabilizer was also considered and would be effective at zero vessel speed, but the cost was considerably greater when compared to the tank system and it cannot be used during a "silent ship" condition.

General Arrangement

The ideal arrangement of an oceanographic vessel will provide the scientist with a sea-going vehicle on which he may enjoy the highest possible ratio of effective research manhours to total operational manhours. The interrelation of laboratories, working decks, navigational manhours. The interrelation of laboratories, working decks, navigational spaces and other areas is of vital importance to the success of such a vessel.

The entire after half of the main deck, with the exception of the machinery casing, is devoted to the exposed working deck and the main laboratory. The largest expanse of the laboratory is within the area of minimum motion. Three large doors provide direct access from the exposed deck and are protected by overhangs of the deck above. This

location of the working deck allows the forecastle deck to extend past amidships and cover fully two thirds of the main deck to give the maximum internal volume for laboratories and accommodations. This high freeboard forward allows the vessel to be driven into head seas while the scientists work on the after deck comparatively free of wind and spray, to prepare for the next station. Great care has been taken to provide convenient access from both the exposed working deck and the main laboratory to the other decks.

The top laboratory is connected directly to the chart room and thereby to the wheelhouse. It will have a 360° view of the horizon, and principally will be the center for geophysical, acoustical, and navigational work.

Versatility

Since much of the equipment comes on and off our ships for nearly every voyage, versatility must be the keynote of a research ship. We have tried to facilitate the complete change-over, while in port, from one discipline to another and to permit ease of modifications as necessary while at sea. Failure to provide such versatility means either that things do not get done or that they are done at too great expense.

There have never been enough convenient ways to hold or lash things down on our ships. Therefore, the deck aft and to starboard of the main laboratory will be completely flush except for the "A" frame, two vertical capstans, and the bulwarks. Flush tie-down pads for 1 inch diameter bolts are spaced 24″ on centers throughout the deck area. Temporary, portable equipment can be bolted to these flush pads in the deck and will be powered by connection to the watertight electric outlets on the working decks. Such equipment can include special winches, such as a variable depth sonar hoist, special boat hoists, etc. Hatches are flush watertight, but if required to be open at sea (for instance, when using explosives from the magazine), coamings of the required height may be bolted on to provide protection from flooding. At the "A" frame a portion of the bulwark is removable to decrease the lift required in putting heavy weights or bulky objects over the side of the ship. A stern ramp leads from the deck to the waterline aft. The low laboratory door sill heights are invaluable when handling laboratory equipment and-or-stores at the end of a cruise.

In the area of least motion the laboratory for gravity measurements will be located as well as the gyroscopes for the GEON navigation system.*

Each laboratory will have a gyro compass repeater, electro-magnetic log indicator, sound powered telephone, intercommunication system, closed circuit television receivers, and a patch panel system. When needed, six aquaria, each 3′ x 3′, built of non-toxic material (fiberglass) will be located in the main lab. Each tank will have individual and separate temperature control so that organisms can be maintained at the temperature of their natural habitat. The non-toxic running salt water system will have one or more taps available in each lab, and at appropriate places on deck for the rinsing of plankton nets.

Center (or internal) Well

In a broad sense the centerwell is regarded as a scientific space in which the adverse problems of weather and accelerations due to roll and pitch are minimized; a space through which the scientist can best make visual and mechanical contact with the water. For many observations it should provide the capability of doing good work in higher sea states than working over the side.

* See; "The level of sea level at sea", Oceanus, Vol. VIII, No. 2.

The advantages of a centerwell will be to permit the cable or tow point to leave the ship near the point of least motion. Protected from spray and inclement weather the oceanographer may operate more efficiently, while the chance of fouling a cable on screws or rudder should be reduced as the cable leaves the ship at keel level. By changing or closing the bottom opening the centerwell space can be used as a fuel tank, fish tank, wet lab, dry lab, or cargo space for extra heavy equipment.

The centerwell should permit electronic, photographic gear, etc., to be handled, serviced, and repaired on the wire and under cover away from ice — rain — wind and, spray. High speed underway sampling may also be done through the well and with the aid of a large scoop and filter for catching and filtering near surface marine life.

Power Plant

The choice of the most suitable propulsion system and the selection of the most appropriate machinery has been basic to the whole concept of the the ship under construction and is a matter which affects every feature of design. The fact that the propulsion of the vessel will be steam is perhaps unique for this size craft.

The use of underwater sound is rapidly advancing as one of the major tools of oceanography and bears upon important scientific, military, and commercial problems.

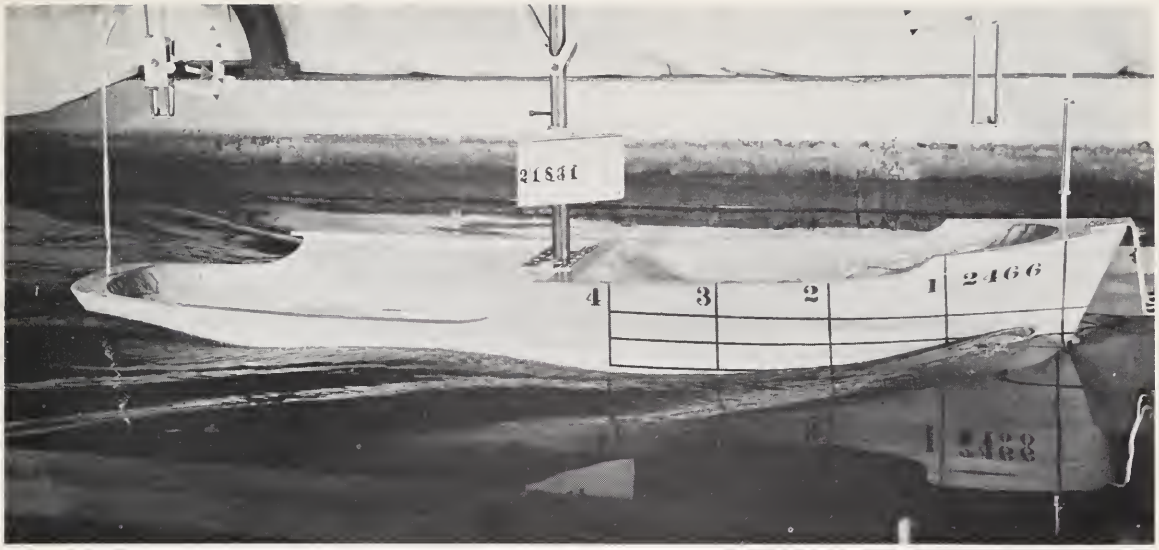
It would have been possible to install a diesel-electric propulsion system. However, the steam plant is definitely superior for continuous low speed operation and for reduced noise and vibration. Even the most optimistic of the experts consulted on sound isolation predicted a greater sound level for the isolated diesel engines and this at a cost above that of the steam plant. Our operating experience with diesel and diesel-electric powered vessels and experience with the steam-powered USCG 'Yamacraw' supports these findings. The latter vessel was remarkably quiet and free from vibration.

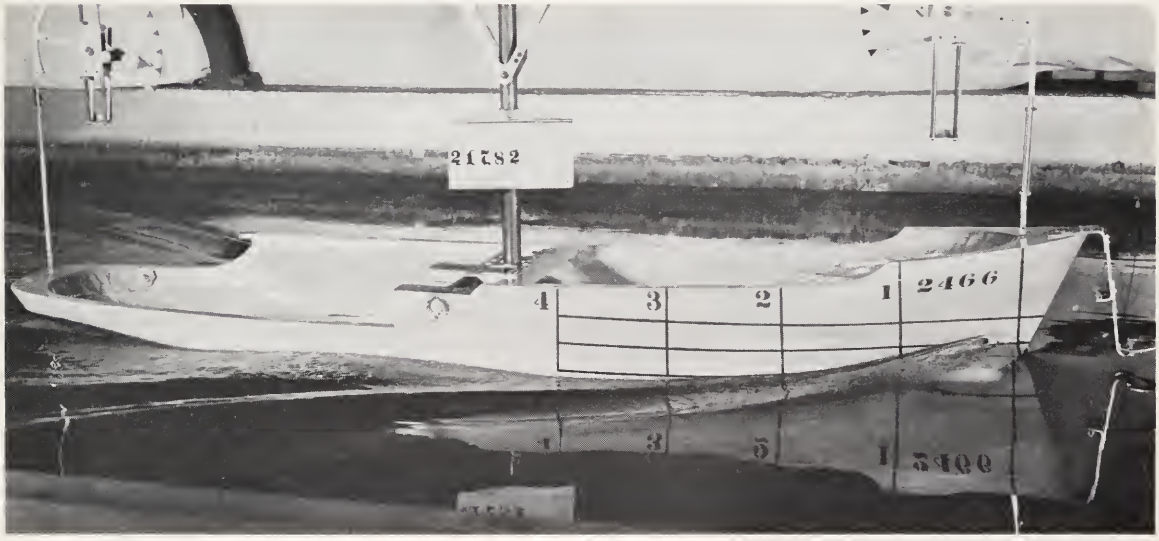
The steam plant requires a larger ship because the vessel must carry twice as much fuel oil as the diesel ship to obtain the required range. It was found that if this increase in ship size were added in the form of greater length the additional cost would be equal to the cost of a sound isolated diesel-electric installation. Comparative fuel costs should be equal because the cost per ton of fuel is about half that of diesel oil. Furthermore, the larger ship with proportionately more tankage has qualities, due to its increased size, which offset this apparent disadvantage. The 195 foot design has 30% more laboratory space and 25% more useable deck space, while, of course, the sea-keeping ability increased with the size.

By use of the duplicate propulsion system with simple steam engines there is a reduction of on-board spare parts which relieves the space problem always present on a research ship. Simplicity of construction and operation, low rotative and reciprocating speeds, and conservative mechanical rating are characteristic of the Unaflow steam engine. Information gained from one of the largest tugboat operators shows that such a power plant results in maintenance costs which are about one half as great as for a similar diesel plant.

First Cruise

The keel for our new ship will be laid down in early June and we expect delivery of the 'Atlantis II' in December. After a few short trial cruises, the ship is scheduled to go to the Indian Ocean to participate in the International Indian Ocean Expedition through 1964.

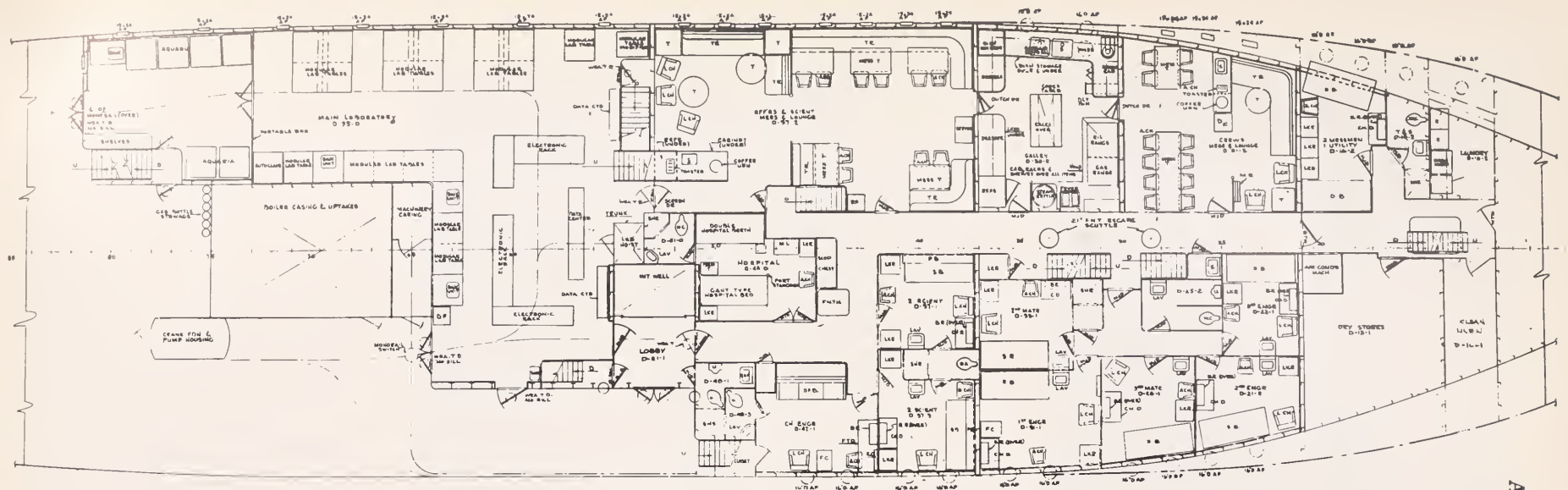




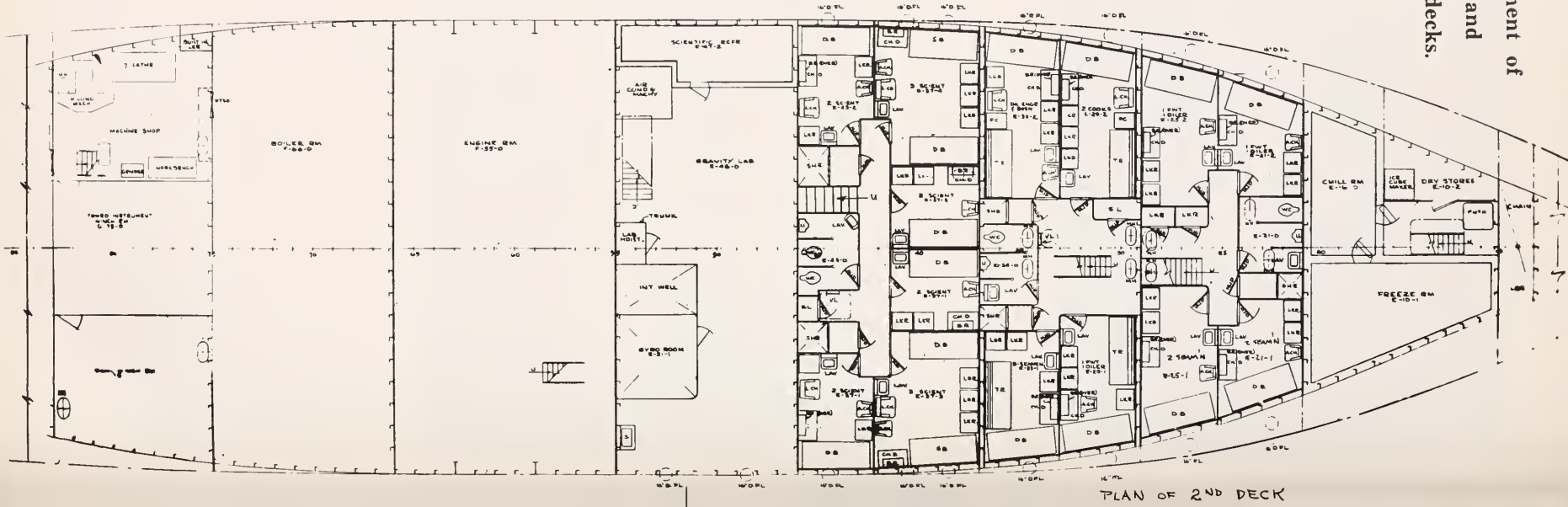
Two views of the model testing in the Davidson Laboratory of the Stevens Institute of Technology. Above without the bulbous bow, below with the modified bow. Both tests at a speed of 12.9 knots.

General characteristics

Length overall	209 feet 9 inches (63.8 meters)
Length on waterline	195 ft. (59.4 m.)
Breadth molded	44 ft. (13.4 m.)
Depth amidship (main deck)	22 ft. (6.7 m.)
Design draft (mean)	16 ft. (4.8 m.)
Displacement at design draft	2110 tons
Continuous power	1400 SHP at 175 r.p.m.
Trial speed	13 knots
Service speed	12 knots
Radius of action	8000 naut. miles
Complement	25 scientists 9 officers, 19 crew

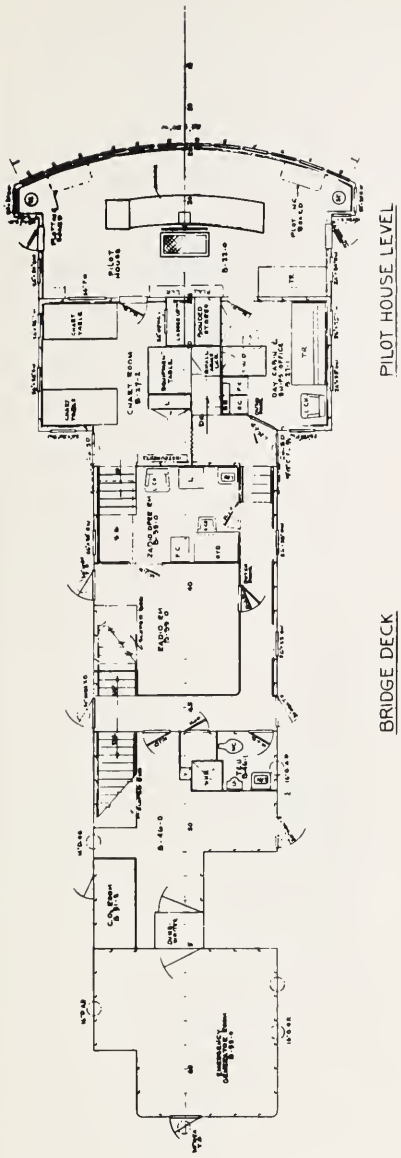


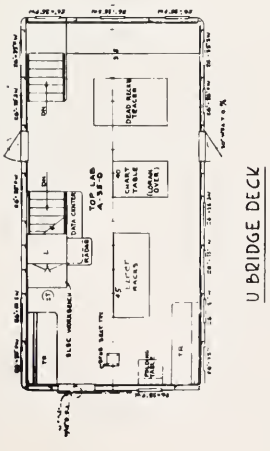
PLAN OF MAIN DECK

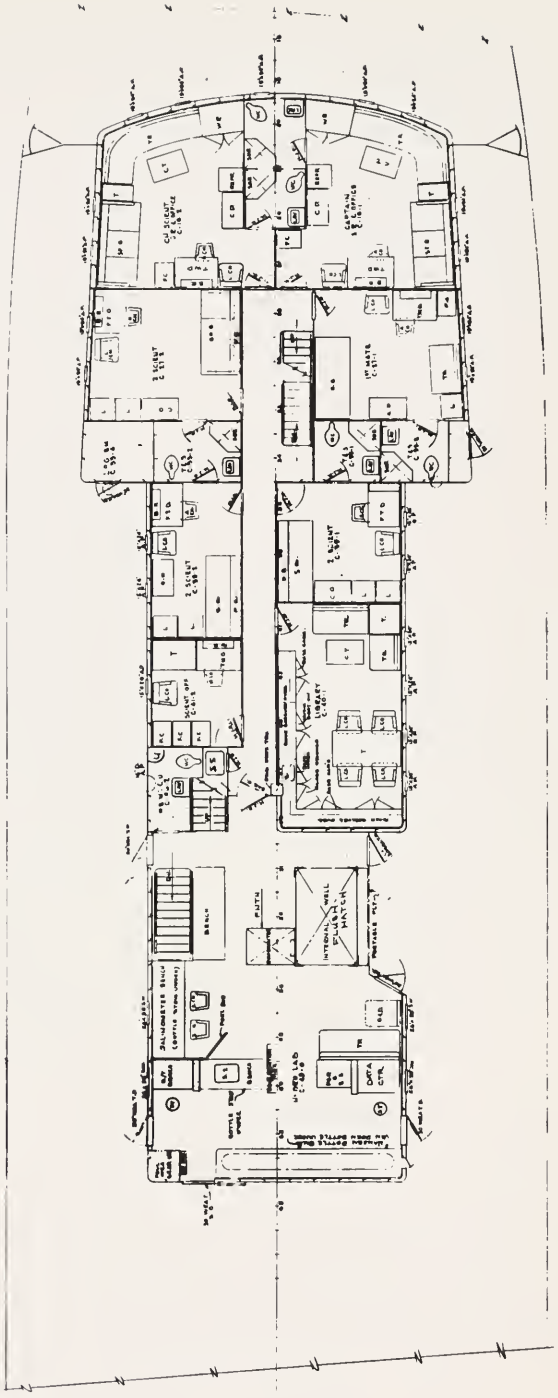


PLAN OF 2ND DECK

Arrangement of Main and Lower decks.







Arrangement of Upper and Bridge decks.

FAY

The Ravages of Time

AT the left is the 'Atlantis' in her original splendor during her trial run off Copenhagen, Denmark on June 18, 1931. Designed by Owen and Minot and built for the Institution by Burmeister and Wain, the ship first arrived in the United States on August 26, 1931. Her cost of $300,000 was part of a grant made by the Rockefeller Foundation.

Some of the ships we have used

By J. HAHN

they ranged from beautiful yachts to fishing boats... the 'Saluda' and the "big" 'Reliance'...

RONNE

RONNE

. . . and then there was a whole fleet of little things during the war. There was the "Little" 'Reliance,' the 'Asterias,' the 'Mytilus,' the 'Claire,' the 'Risk,' the 'Anton Dohrn,' the 'Lobster,' and the 'Dot III' . . .

. . . . . and (oh, fond memory) the

. . . . on charter, loan or use were the 'Albatross III,' and the U.S.C.G. 'Yamacraw,' the 'Hazel II' and many others. . . . .

FAY

.... while, for years we owned the lovely teak-built 'Caryn'....

..... and sights as this may never be seen again. The 'Atlantis,' the 'Blue Dolphin' and the visiting brigantine 'Yankee'...

SPOONER

Still very much

the 213 foot 'Chain' is the largest ship in our fleet and is a converted Navy ship.....

....the 36 foot 'Asterias,' a New England draggertype, built for the Institution in 1930.

in use . . .

. . . . the 125 foot 'Crawford' was acquired in 1956 and was a U.S. Coast Guard vessel.

. . . . the 103 foot 'Bear' was acquired in 1950; she had been an Army transport. . . .

SPOONER

WRIGHT

..... the 'Eugenie VIII,' acquired in 1961, is most useful for our game fish studies .....

..... the chartered 'Cap'n Bill II' found large concentrations of lobsters in deep water .....

..... and then — and then there was the poor old 'Balanus,' almost lost at sea ... but finally recovered — the Gulf Stream was too much for her.

..... but no story about our ships is complete without our "Senior Employee" Chief Harold Backus, for 25 years Chief Engineer of the 'Atlantis'.

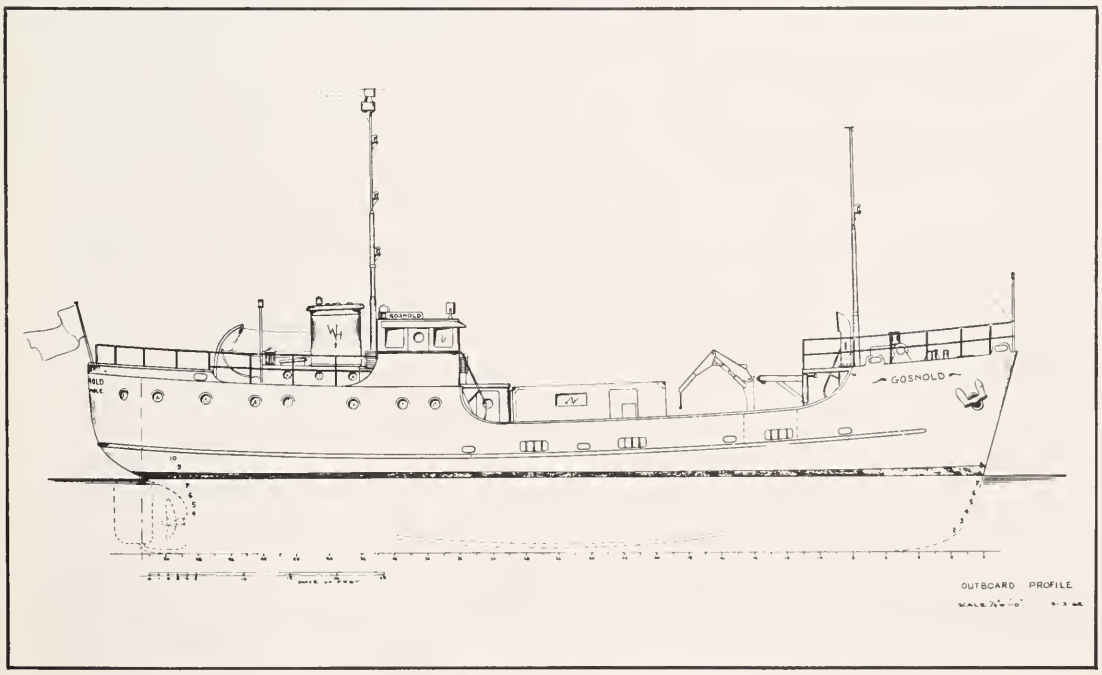
FAY

Bound for New Careers In Research

U.S. NAVY

THE 243-foot 'Williamsburg', once Harry S. Truman's presidential yacht, will be used for the U.S. biology program during the International Indian Ocean Expedition, under the direction of Dr. John H. Ryther of our staff. The Institution will operate her under a contract from the National Science Foundation, which has taken title from the Navy. Nine cruises of two to three months from a base in Bombay are planned for 1963-64. 'Williamsburg' was built as a private yacht in 1931, joined the Navy as a gunboat early in the war and was laid up in 1953. She will accommodate 29 scientists (four in the presidential suite) and is capable of 16 knots.

The 99-foot 'Gosnold' will join the Institution fleet this summer. She will be used primarily for short cruises, with a crew of six and scientific party of seven. Built in 1941 for Army service, she has been laid up in Florida for 10 years.



Briefly:

Atlantis cruise 275

THE 'Atlantis' is on her way home. After a stormy winter season in the Mediterranean she has left that short choppy swell for the long rolling waves of the blue Atlantic. There are many names given to those winds of the Mediterranean, among them: the Mistral, the Bora, and the Sirocco — it seems that the A-boat endured them all and accomplished her task in spite of them. One hundred and nineteen hydrographic stations were made with particular concentration in the Adriatic-Ionian area where work was combined with the efforts of the Yugoslavian ship 'Bios' in the straits of Otranto, and, in the Aegean-Cretan Seas in the company of the NATO-operated Italian vessel, 'Aragonese'. It is curious that the number of foreign scientists on the roster of Cruise 275 exceeded those from the U.S.A. This was not a guest list; each contributed his part in a cooperative endeavor. Scientists participating were A. R. Miller, Chief Scientist, C. D. Densmore, R. G. Munns and R. E. Riegel, all from Woods Hole; P. Tchernia, P. Guibout, and A. de Quay from the Laboratoire d'Océanographie Physique in Paris; A. Skrivanic of the Oceanographic Institute at Split, Yugoslavia; H. Kolokythas, director of the Greek Hydrographic Service, and A. de Maio of the Naval Institute in Naples. M. Zor-Amanda of Split was la cheffe de mission aboard the 'Bios'. H. Charnock of the National Institute of Oceanography and of the SACLANT ASW Research Center was in charge of the 'Aragonese' with our own John Bruce aboard.

It was said of the 'Atlantis' aboard the 'Aragonese', lying-to in a lee while her anemometer went off scale: "Such a small ship! Why does she not seek a lee?"

Someone responded, "She was built to stay out in deep water no matter what the weather. It is land that frightens her."

— A. R. Miller

The editor greatly appreciates the messages so many people wrote on their reply cards. As he went to sea he was unable to answer each individually.

Summer Fellows, 1962

SUMMER fellowships continue to be an important part of the educational program of the Institution. They have been awarded this year as follows:

Barbara Alexander, a junior at Reed College majoring in chemistry, will work with Dr. Alvin Siegel.

Evelyn Aliferis, a senior at the University of Massachusetts majoring in zoology, will work with Dr. Vaughan T. Bowen and Dr. Roger Bachmann.

Philip L. Ballard, a graduate student in biochemistry at the University of Michigan, will work with Dr. Paul C. Mangelsdorf Jr.

Charles Henry Copeland, a junior at the University of Alabama majoring in chemistry-physics, will work with Dr. William S. Richardson.

Susan Ann de Ropp, a junior at Cornell University majoring in biochemistry, will work with Mr. Charles S. Yentsch.

Vincent P. V. Flanagan, a graduate student in physics at Cambridge University, will work with Mr. Alfred H. Woodcock and Dr. Duncan C. Blanchard.

Lois May Fleischer, a junior at Allegheny College majoring in chemistry, will work with Dr. Max Blumer.

Peter Herring, a senior at Cambridge University majoring in zoology, will work with Dr. Bostwick H. Ketchum and Dr. George D. Grice, Jr.

David S. Hirschfeld, a junior at Harvard College majoring in biochemical sciences, will work with Dr. Edward R. Baylor.

Joel Anthony Huberman, a senior at Harvard College majoring in biochemical sciences, will work with Dr. Francis G. Carey.

Eric L. Mills, a graduate student in zoology at Yale University, will work with Dr. Howard L. Sanders.

Dr. Alvin Nason, McCollum-Pratt Institute, The Johns Hopkins University, will work with Dr. Stanley Watson and Dr. Ketchum.

Jean M. Noel, a graduate student in geophysics at California Institute of Technology, will work with Dr. John B. Hersey.

Samuel M. Savin, a graduate student in geochemistry, California Institute of Technology, will work with Dr. Bowen and Dr. Dayton E. Carritt.

Bert I. Shapiro, a senior at Swarthmore College majoring in zoology, will work with Dr. John M. Teal.

John H. Steele, of the Marine Laboratory in Aberdeen, Scotland, and the Institute of Marine Science at the University of Miami, will work with Dr. John H. Ryther and Mr. L. V. Worthington.

Fellowships have also been awarded to six of the group who will take part this summer in the Geophysical Fluid Dynamics Course, under the direction of Dr. George Veronis and Dr. Melvin E. Stern. They are:

Peter J. Bryant, a graduate student in applied mathematics at University of Cambridge.

James Reed Holton, a graduate student in meteorology at Massachusetts Institute of Technology.

Joseph Pedlosky, a Ph.D. candidate at the International Meteorological Institute in Stockholm.

H. Thomas Rossby, a Ph.D. candidate in the department of applied mathematics at the Royal Institute of Technology in Stockholm.

Pierre Souffrin, a graduate student at Institut d'Astrophysique in Paris.

Roger Terry Williams, a doctoral candidate in meteorology at the University of California, Los Angeles.

In addition, the following students will take part in a course in Observational Physical Oceanography, under the direction of Dr. Arthur D. Voorhis:

Yanglai Cho of the physics department at Vassar College.

Robert C. Clarke Jr., a junior majoring in chemistry at Harvey Mudd College.

Robert C. Elvander, a graduate student in meteorology and oceanography at New York University.

William D. Nathan, a junior majoring in mathematics at Hiram College.

Everett C. Nickerson, a senior majoring in meteorology at University of California, Los Angeles.

Roger J. Breeding, a senior majoring in physics at Wesleyan University.

John H. Schwarz, a senior majoring in mathematics at Harvard University.

Associate Director is Named

DR. BOSTWICK H. KETCHUM, a member of our research staff since 1940 (and author of several OCEANUS articles), has been named Associate Director of Biology and Chemistry, a new position at the Institution.

Dr. Ketchum has been Senior Oceanographer since 1954, having previously held positions of Associate Marine Biologist, Marine Microbiologist and Senior Biologist. A graduate of Bard College and Columbia University, he received his Ph.D. from Harvard University, after spending three summers at the Institution on a graduate fellowship. Before joining our staff he worked at the Biological Laboratories at Harvard and taught biology at Long Island University.

In addition to his work at the Institution, he is a lecturer on biological oceanography at Harvard and has served on many national committees. Among them are the National Academy of Sciences Committee on Atomic Radiation in Relation to Oceanography, Marine Biology and Fisheries; the American Institute of Biological Sciences Committee on Hydrobiology; the National Science Foundation Advisory Panel for Environmental Biology; and the Advisory Screening Committee for Biology and Agriculture for awards under the Fulbright and Smith-Mundt acts. He has been consultant to the U.S. Public Health Service since 1953 and has taken part in several international meetings, including the Second International Conference on Peaceful Uses of Atomic Energy in Geneva in 1958. He has served as vice president of the Ecological Society of America and as president of the American Society of Limnology and Oceanography.

Despite all this, he has also been very active in local civic affairs. He has been a town meeting member (Falmouth has a representative town meeting) for 12 years, is on the Town Committee on Fluoridation of Drinking Water and has been president of both the Woods Hole Civic Association and the Woods Hole Child Center.

Associates' News

MORE than 800 Associates, wives and friends attended a highly successful series of three Associates' dinner meetings during the first week in May. Wilmington on Monday, New York on Tuesday and Boston on Thursday made it a hectic week for Dr. Fye, Ronald Veeder, Homer Ewing and of course, for the principal speaker of all three evenings, Dr. John C. Lilly, Director of the Communication Research Institute of St. Thomas, V. I., and author of the book "Man and Dolphin".

Dr. Lilly used colored slides, motion pictures and tape recordings to illustrate his studies of dolphins, their ability to communicate with each other and the likelihood that they may some day communicate with man. Most of the pictures showed a bottle-nosed dolphin named Elvar — who has become very much of a Lilly household pet — reacting to various human actions. The sound track reproduced Elvar's response to spoken words; Dr. Lilly noted that an optimist — and he is one — could detect a real similarity in the two sounds.

Dr. Fye also spoke briefly at each meeting, to describe the work of the Institution during the past year. He stressed particularly the role of the Associates in helping to provide funds for fellowships and other educational efforts at Woods Hole.

THE ASSOCIATES of the Woods Hole Oceanographic Institution is a group of individuals, corporations and other organizations who, because of their love for the sea and interest in science and education, support and encourage the research and related activities of the Institution.

Membership dues in the Associates are as follows:

Member	$50
Contributing Member	$100
Patron	$500
Life Member	$1,000
Corporate Member	$1,000
Sustaining Corporate Member	$5,000 or more.

All contributions and dues are tax deductible to the extent provided by law.

HOMER H. EWING, **President**

RONALD A. VEEDER, **Executive Assistant**

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